Jun 25th, 1:50 PM - 2:10 PM

Concurrent Sessions C: Fish Screening at Water Diversions II - Red Bluff Fish Passage Project - Design & Construction Challenges for 2,500 CFS Fish Screen

Jeffrey P. Sutton
Tehama Colusa Canal , Authority General Manager

Robert Gatton
CH2M HILL

Peter Rude
CH2M HILL

Tehama-Colusa Canal Authority Fish Passage Improvement Project at Red Bluff Diversion Dam – Design & Construction Challenges

Presented by: Peter Rude/CH2M HILL *June 25, 2013*

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Project Location

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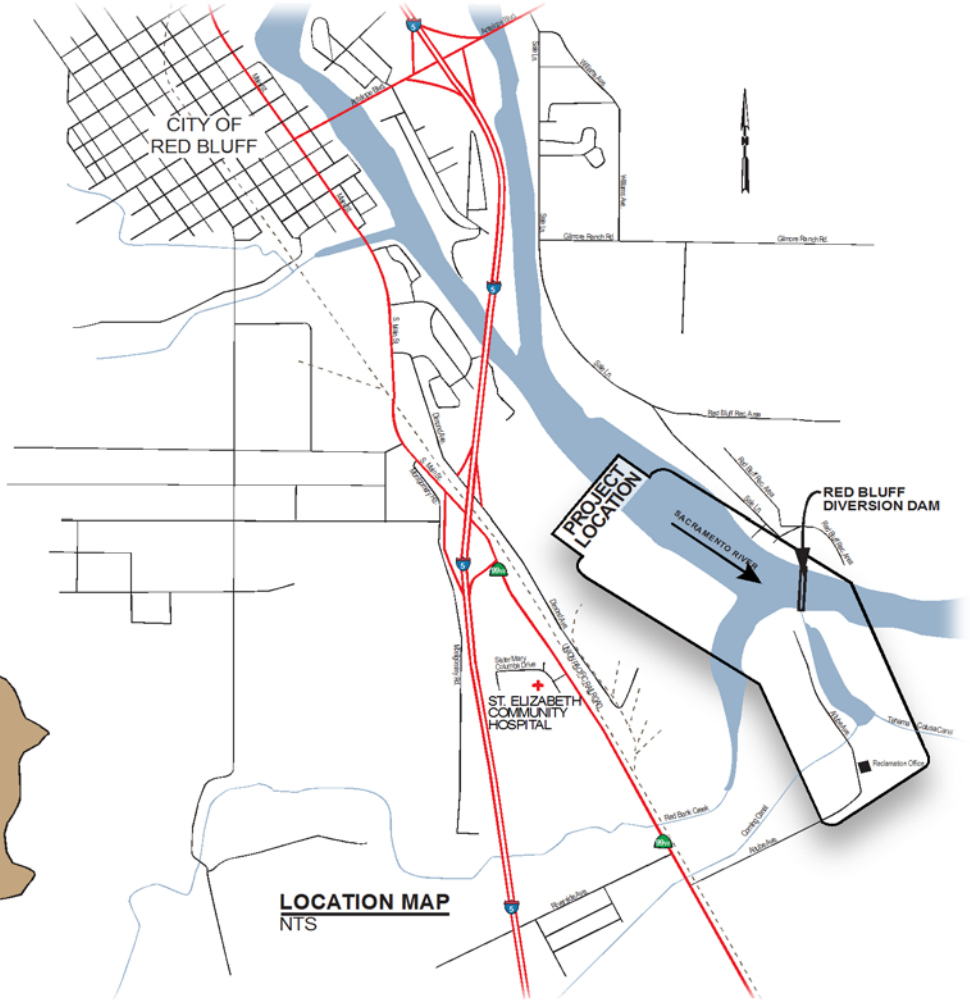
Red Bluff Vicinity & Location Map



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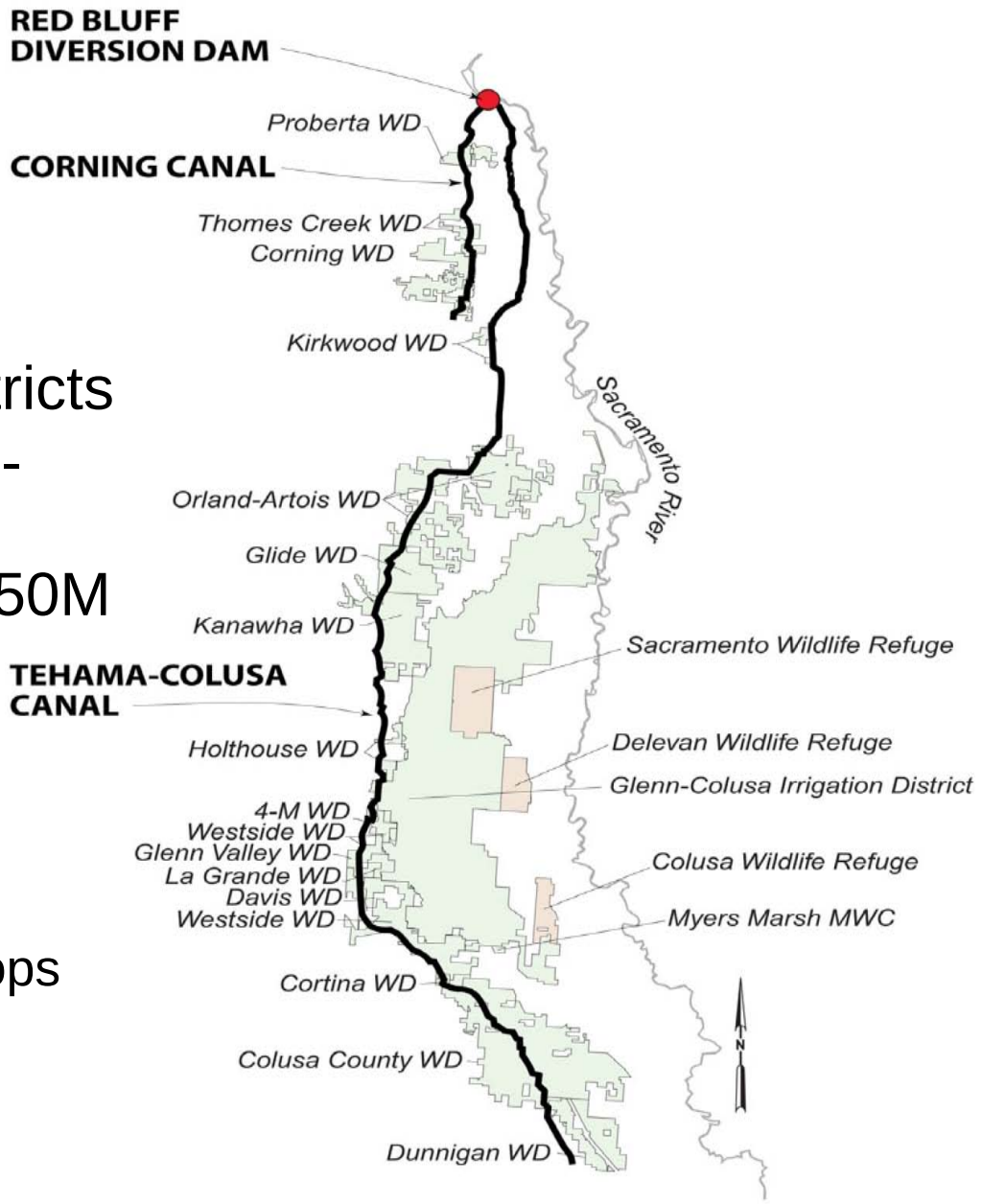
TCCA Background

- 17 member water districts
- 150,000 acres of high-value cropland
- Annual production $250M
  - almonds
  - pistachios
  - prunes
  - olives
  - grapes
  - rice & other annual crops
- 3 wildlife refuges



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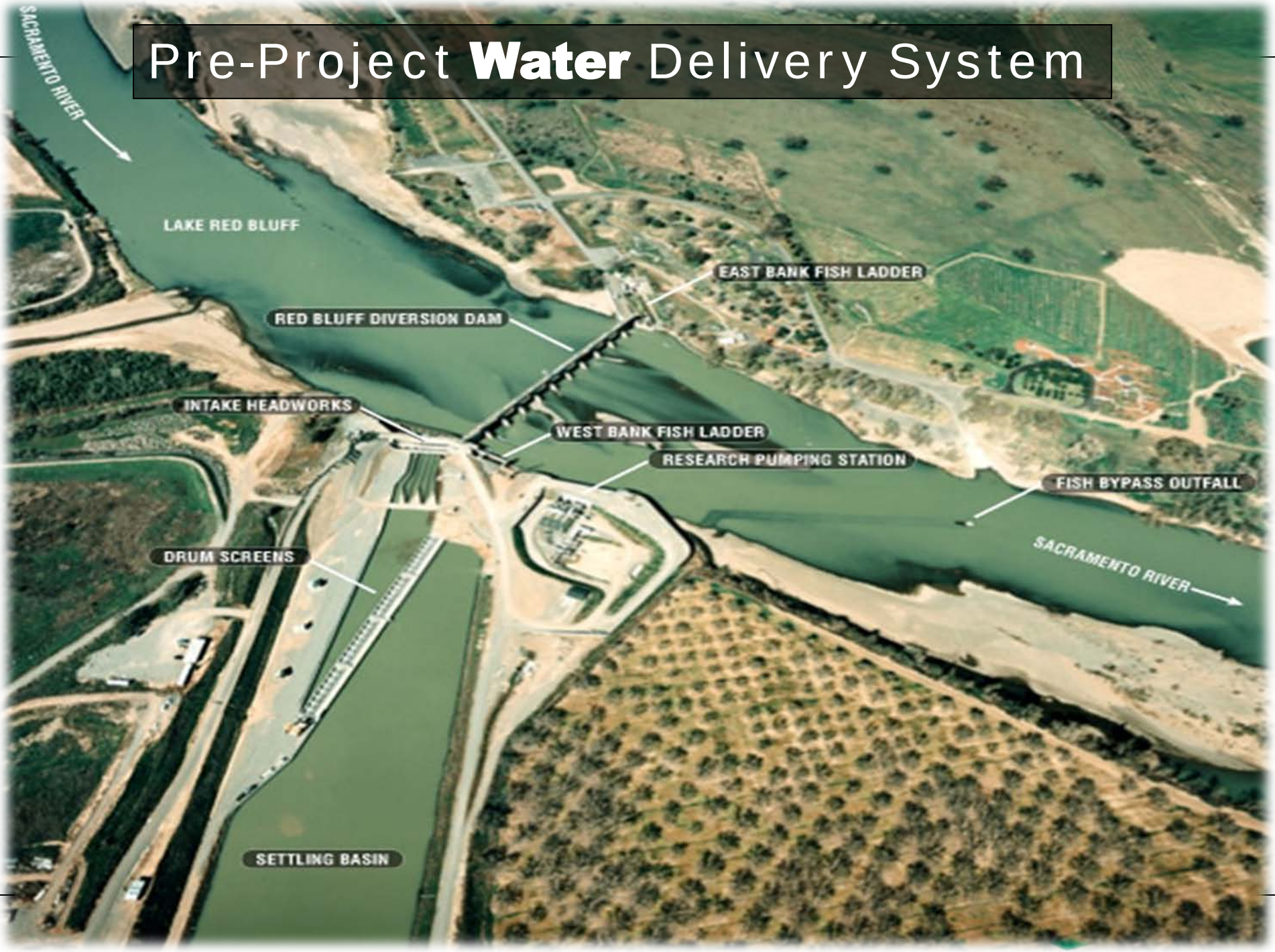
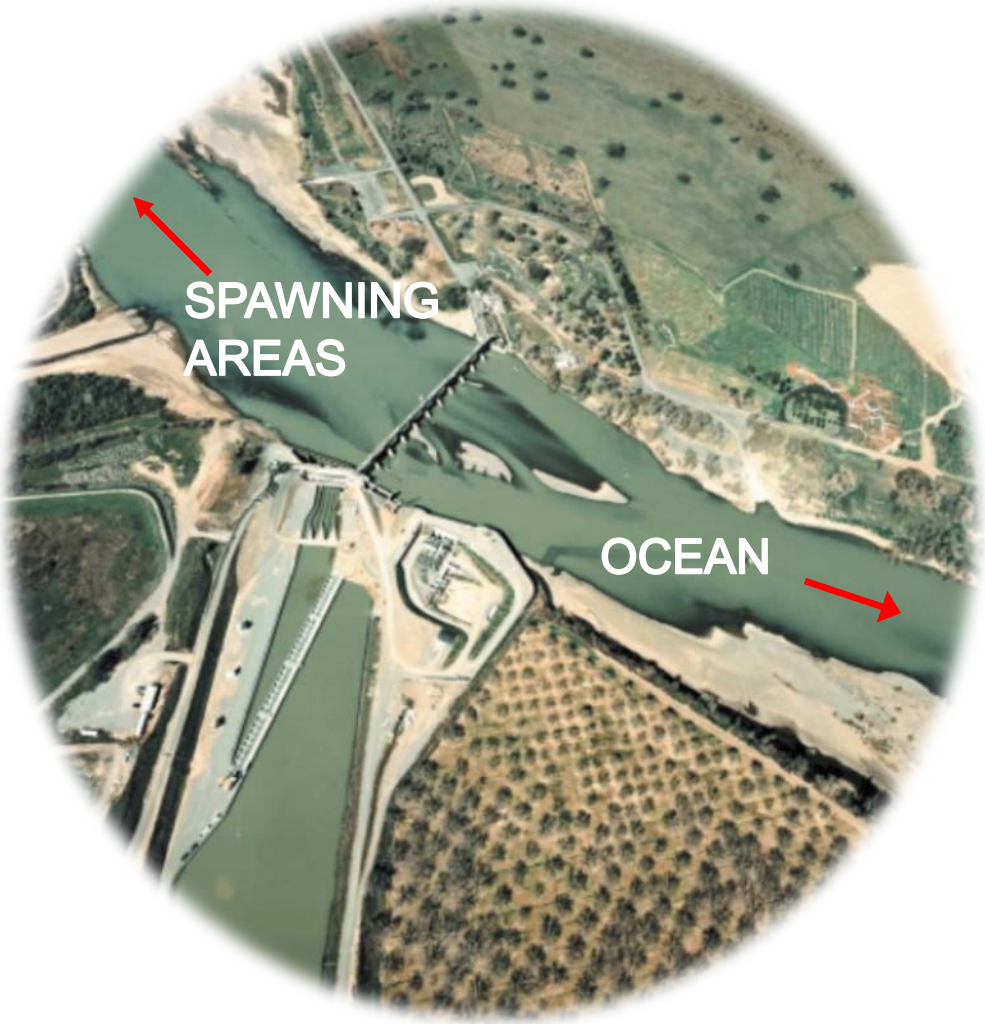
Pre-Project **Water** Delivery System

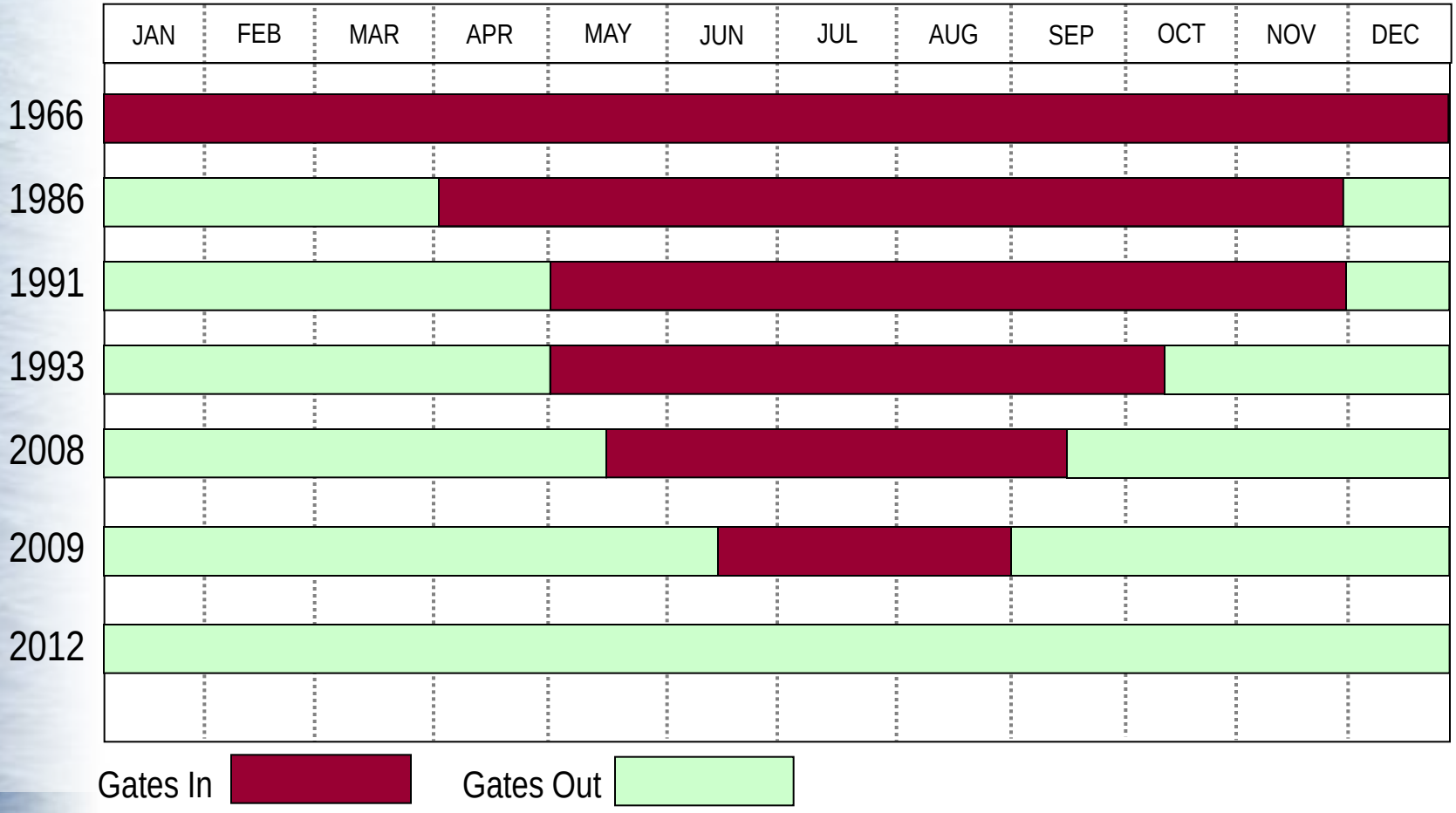


The Problem

- RBDD impedes fish passage for ESA species:
  - Spring-run
  - Winter-run
  - Steelhead trout
  - Green sturgeon
- ESA concerns have reduced “gates-in” operation



Gate Operations at Red Bluff Diversion Dam



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Gates Up for Flood Flow and Fish Passage

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Project Challenges

- Second largest diversion on Sacramento River (2,500 cfs)
- Improved fish protection and fish passage past the RBDD
- Reduce fish exposure time to fish screen
- Flexible and reliable water supply and delivery infrastructure for TCCA
- Construction on former wood products industrial site
- Federal Judge ruling Gates up Sept 2011

Pre-Project Overview (Spring 2010)

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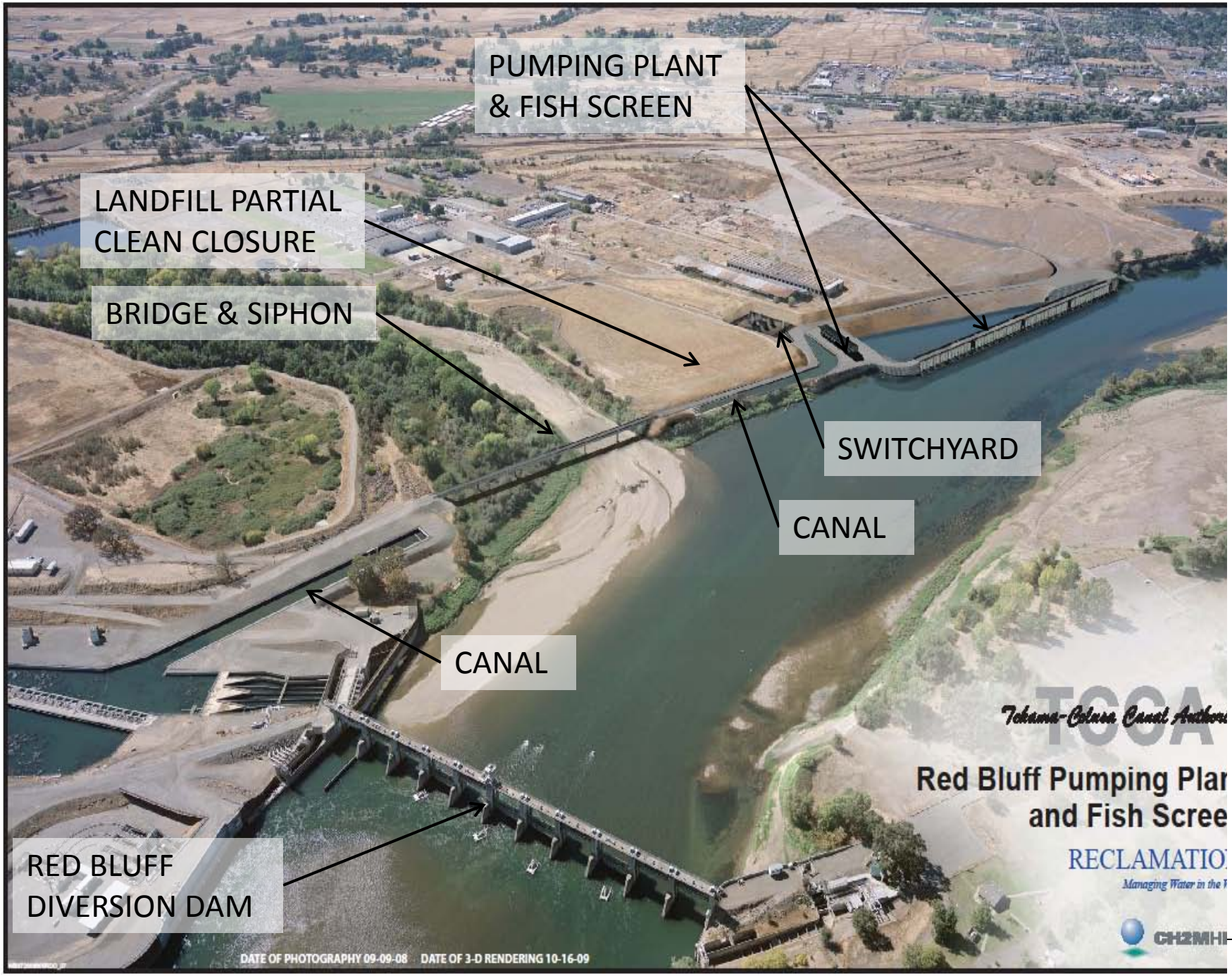
PUMPING PLANT
& FISH SCREEN
LANDFILL PARTIAL
CLEAN CLOSURE
BRIDGE & SIPHON
SWITCHYARD
CANAL
CANAL
RED BLUFF
DIVERSION DAM
Red Bluff Pumping Plan
and Fish Scree
RECLAMATIO
DATE OF PHOTOGRAPHY 09-09-08 DATE OF 3-D RENDERING 10-16-09

Site Excavation Facts

- Non-Native Fill Material Excavation – 277,000 CY (includes Pactiv Landfill, Forebay, Pumping Plant, and Switchyard)
- Stockpiled into 1,000 CY, tested for over 250 analytes, most sent offsite for disposal
- Native Material Excavation – 300,000 CY (includes Pumping Plant and Switchyard)

Pactiv Landfill (Oct. 2010)

Pactiv Landfill (Jan. 2011)

GEN III Stockpiling and Testing Non-Native Material (Jan. 2011)

Canal Facts

- Approximately 2,100 ft of open canal comprising sheet pile walls and reinforced concrete floor
- Design Flow Rate: 2,500 cfs = 74 mcs
- Dimensions: 36 ft (w) x 28.5 ft (h)
- Excavation: 38,000 CY of native material

Canal Lean Concrete Placement (Dec. 2010)

Red Bank Creek Siphon Facts

- 900 ft siphon comprised of three cast-in-place reinforced concrete discharge barrels to convey water beneath Red Bank Creek
- Design Flow Rate: 2,500 cfs
- Dimensions: (3) 10 ft (w) x 9 ft (h)
- Excavation: 49,000 CY of native material

Siphon Concrete Pour (Nov. 2010)

Siphon & Canal (Dec. 2010)

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Siphon - 1 of 3 barrels (Dec. 2011)

Fish Screen Structure Facts

- 1,118 ft long, positive barrier flat-plate fish screen structure
- 60 fish screen bays
- 7 fish refuge bays
- 4 automated screen cleaning mechanisms
- Sediment removal water jetting system
- Volume of reinforced concrete – 9,300 CY

Fish Refuge Physical Model

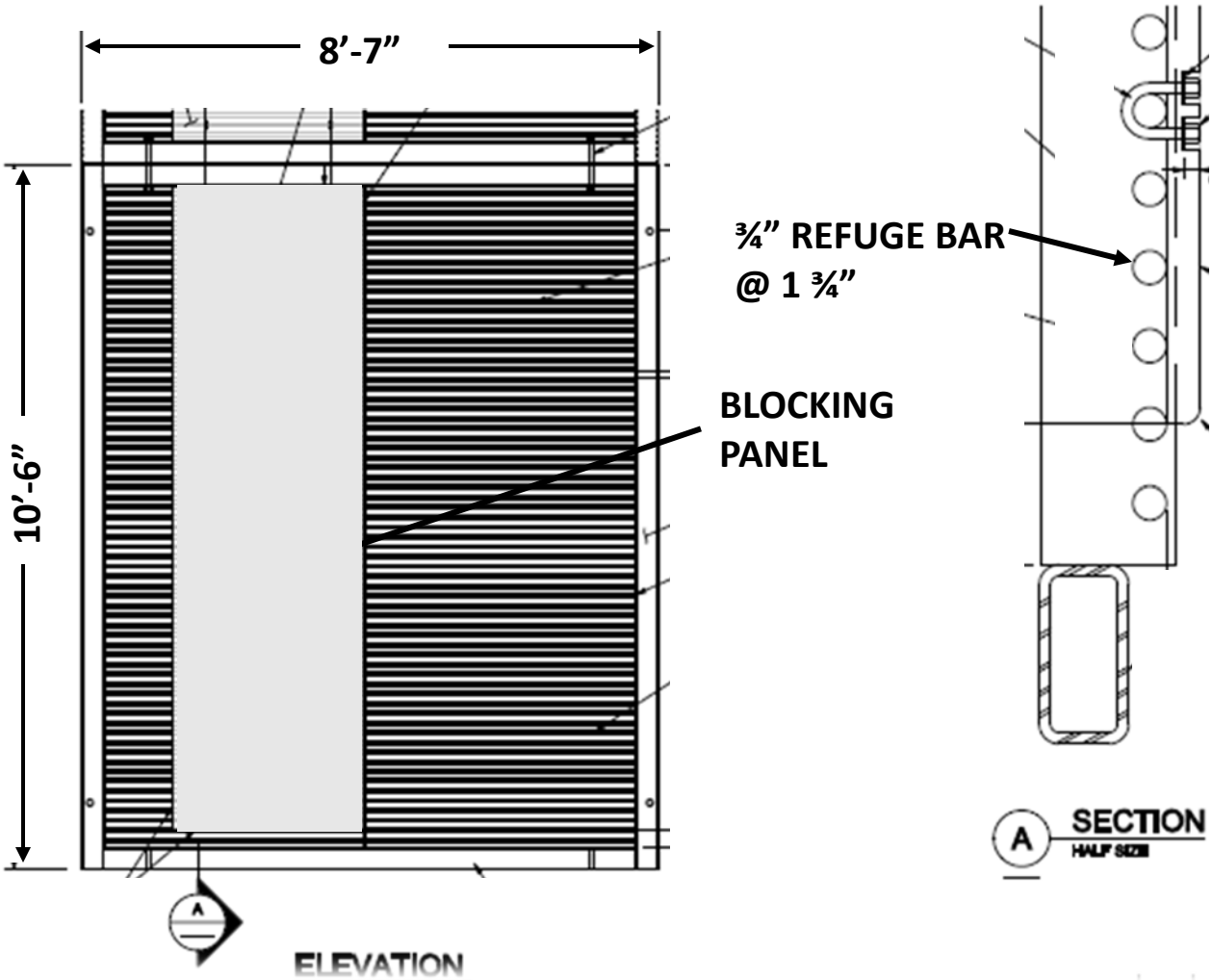
- Reclamation's Technical Service Center (TSC) constructed a 1:1 scale physical model of the fish refuges to optimize the design. Critical design aspects obtained from the model include:
  - Depth of refuge
  - Blocking panel configuration. Found to reduce velocities in refuge and create uniform flow conditions
  - Optimal width of refuge bay/area
- Fish species evaluated in model: Chinook, Sturgeon, and Trout.

Fish Refuge Physical Model

TCCA Fish Refuge

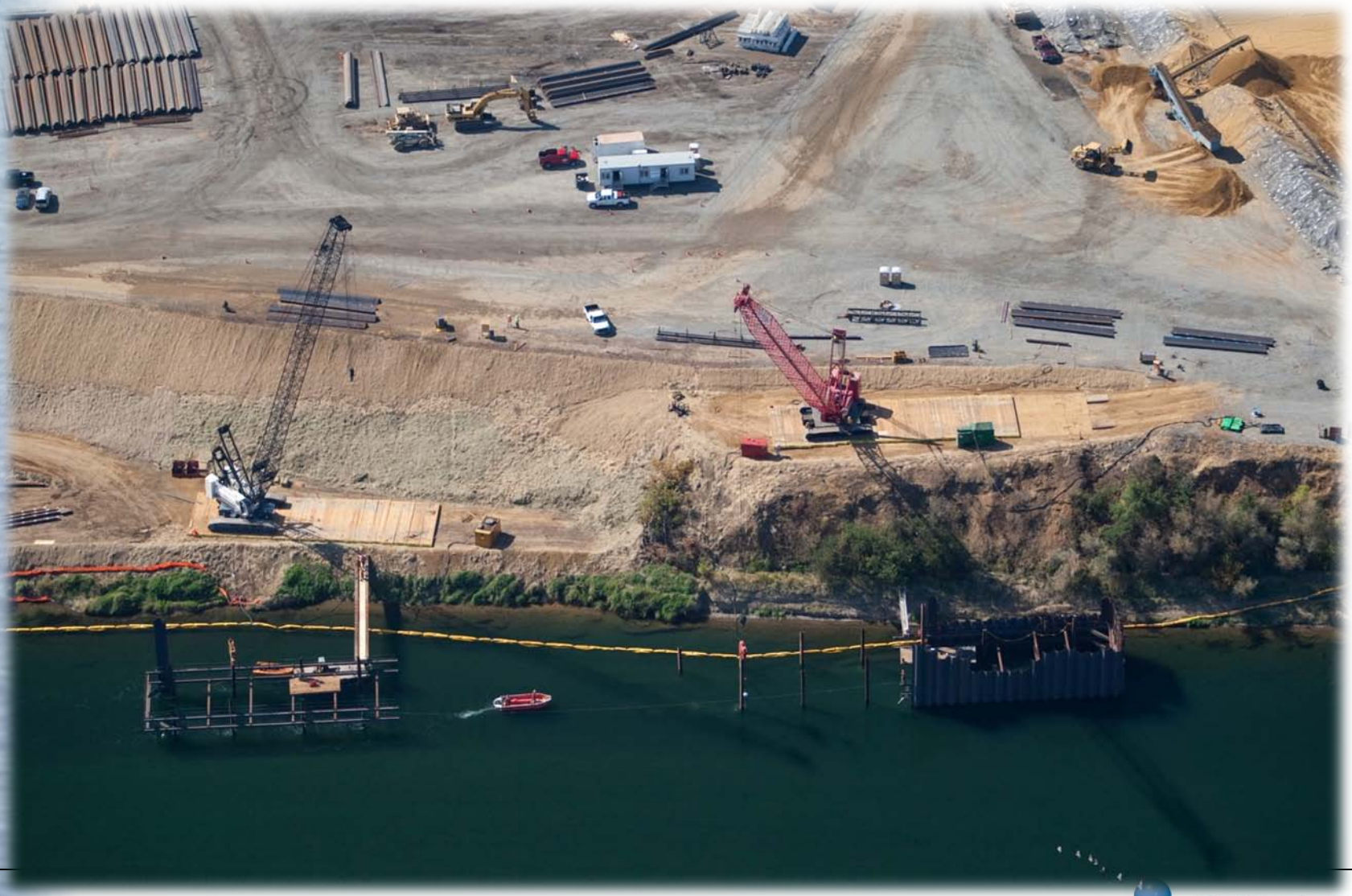
- Four full-height refuge bays equally spaced along the fish screen structure.
- Three additional refuge areas in blowout panels.
- Horizontal refuge bars: ¾-inch SST spaced 1¾ inches on center.
- UHMW blocking panels.
- Acrylic viewing window can be installed in full-height refuge bays to observe refuge area.
- Field research upcoming to document fish refuge use by juveniles.

TCCA Refuge Panel



TCCA Fish Refuge

Installing Fish Screen Cofferdam (Oct. 2010)



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Fish Screen Structure (Jan. 2011)

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Fish Screen Structure (March 2012)

Tuning Baffles

Sediment Jetting Nozzles

Fishery Agencies Inspect Fish Screen Structure (April 2012)

Installing Solid Panels (April 2012)

Fish Screen Coffer Dam Removal (May 2012)

Project Operational
June 1, 2012

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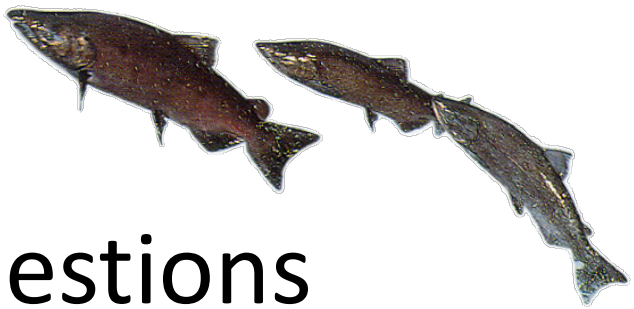

Questions